Pueblo Chemical Agent-Destruction Pilot Plant

Neutralization Followed by Biotreatment

A Partnership for Safe Chemical Weapons Destruction

The Assembled Chemical Weapons Alternatives program, the U.S. Army Pueblo Chemical Depot and the surrounding community worked together to select neutralization followed by biotreatment to destroy the chemical weapons stored at the depot.

In September 2002, the Bechtel Pueblo Team was awarded a contract to design, construct, test, operate and close the facility that will utilize this technology: the Pueblo Chemical Agent-Destruction Pilot Plant.

Neutralization followed by biotreatment uses hot water to neutralize the chemical agent, effectively destroying the mustard agent molecules. The resulting hydrolysate is mostly water and thiodiglycol, a common industrial chemical that is readily biodegradable. Ordinary sewage treatment bacteria, or microbes, consume the organics in the hydrolysate. Besides being a common phenomenon in nature, the science of using microbes to help dispose of hazardous waste has existed for decades. Sewage treatment facilities across the country use microbes every day to help break down raw sewage.

In addition, extensively trained, skilled workers and state-of-the-art robotic systems will ensure the safe destruction of Pueblo's chemical weapons stockpile.

Step One: Removing the Energetics

Robotic equipment will remove the weapon's energetic components, including the fuze and the burster. Removing these parts first makes the remaining processes safer. The energetics in the burster will be removed by soaking in a bath of caustic solution. This energetics mixture will be further processed in Step Three. Metal parts, including fuzes that contain very small amounts of energetics, will be disposed of in Step Five.

Step Two: Removing the Mustard Agent

Once the energetic components are removed, the weapon body containing chemical agent will be processed. To remove the agent, the body is robotically accessed and then the agent is washed out with pressurized water.

Step Three: Neutralizing the Energetics and Mustard Agent

After the energetics and agent have been separated from the metal parts, they will be treated in separate tanks with a caustic solution and water respectively. The byproduct from this process is called hydrolysate. The energetic hydrolysate and agent hydrolysate are then combined and further processed in Step Four.

Step Four: Biotreatment

The hydrolysates generated in Step Three will go through the biotreatment process, which consists of large tanks containing microbes that digest and further break down the solution. Water released from the process will be recycled, leaving various salts and biosludge. Biosludge, which is made up of microbe waste products and other bacterial matter, will be filtered to remove water and shipped off-site to a permitted treatment, storage and disposal facility.

Step Five: Disposing of Metal Parts

The final step is treating the weapon's metal parts. Although the metal parts were cleansed of energetics and agent in Step One and Step Two, they still may contain energetics and agent and need to be decontaminated to a higher level. To reach this level of decontamination, the metal parts will be heated to 1,000 degrees Fahrenheit for 15 minutes. The metal can then be recycled.

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